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(54) Bone prosthesis with protected coating for penetrating bone intergrowth

(57) A bone prosthesis (10) has a growth enhancement coating (C) recessed (30) in and protected by its surface topography. The topographic features define gaps under a few millimeters which are readily spanned by new bone growth, while the features protect the coating (C) from abrasion or physical damage. The topographic features substantially surround the coated regions, and prevent migration of flakes spalled during implantation or microparticles shed by the coating (C) as it is resorbed or incorporated in new bone (50) over time. In a preferred embodiment, edge features cast in the surface (S) of a metal prosthesis (10) include dovetail, undercut or skewed faces (W) which firmly interlock with newly-growing bone (50) to form a strong and shear-free, substantially rigid attachment. The prosthesis (10) may be cast in a mold having a complex surface interlock texture, and these molds may be mass produced by an iterative three-dimensional printing technique to build each mold up in layers in the form of a suitable casting negative. The prosthesis (10) is then cast of molten metal in the mold, and the mold material is broken away and cleaned off, e.g., by an etch. A growth enhancer such as hydroxyapatite (HA) is plasma-sprayed to selectively deposit on and completely cover the floors (f) of the recesses (30) formed in the casting. Preferably, the upper surfaces (S) about the recesses (30) are polished, and the recess walls (W) are overhung so they are masked from the coating process. further than causing the HA coating (C) to adhere only in the protected floor (f) regions. The HA floors (f) are at the bottom of pits or macropores, at a depth (d) of under three millimeters, and preferably one-half to two millimeters, so that new bone (50) growth spans the gaps and penetrates into the prosthesis (10) over an extended surface textured region (28).

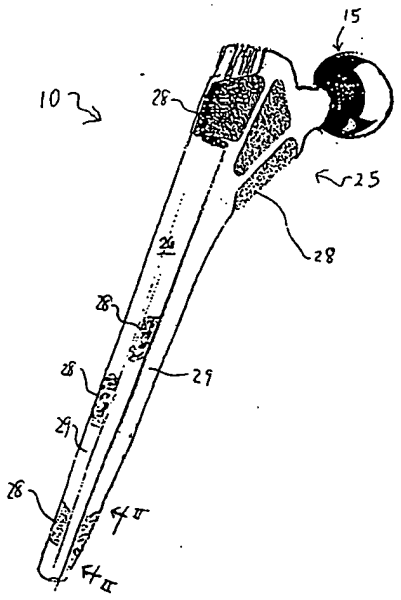

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 6232

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 42 11 343 A (S + G IMPLANTS) * the whole document *	1-5,10, 12-16	A61F2/30 B29C67/00 B22C7/02
A	EP 0 399 163 A (ESKA MEDICAL LÜBECK MEDIZINTECHNIK) * the whole document *	1,10,12, 13,15	
A	US 4 179 485 A (TRITTEN) * column 3, line 24 - line 30; figure 1 *	1,4,10, 12-16	
A	WO 92 21302 A (LUCOCER) * figure 5 *	4,5,16	
A	US 4 795 472 A (CROWNINSHIELD)		
A	WO 86 02824 A (LUNDGREN)		
D,A	EP 0 668 062 A (JOHNSON & JOHNSON PROFESSIONAL)		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
D,A	US 5 204 055 A (SACHS)		A61F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 January 1998	Klein, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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